

WHAT IS CLAIMED IS:

1. A method of manufacturing a semiconductor device comprising the steps of:  
forming a semiconductor film comprising silicon over a glass substrate;  
crystallizing said semiconductor film; and  
oxidizing the crystallized semiconductor film at a pressure higher than 1 atm.

2. A method according to claim 1, wherein said pressure is in a range of 1 to 15 atms.

3. A method according to claim 1, wherein said oxidizing is performed in an oxidizing atmosphere.

4. A method according to claim 1, wherein said oxidizing is performed in an oxidizing atmosphere containing water vapor.

5. A method according to claim 1, wherein said oxidizing the semiconductor film is performed in a temperature of 500 to 650°C.

6. A method according to claim 1, wherein said semiconductor film has a thickness of 100 to 1,000 Å.

7. A method according to claim 1, wherein at least one region of the semiconductor film is completely oxidized to a bottom surface of the semiconductor film during said oxidizing step.

8. A method according to claim 1, wherein said semiconductor device comprises an active matrix type display device.

9. A method of manufacturing a semiconductor device comprising the steps of:

forming a semiconductor film comprising silicon on an insulating surface;

crystallizing said semiconductor film; and

oxidizing the crystallized semiconductor film at a pressure higher than 1 atm.

10. A method according to claim 9, wherein said pressure is in a range of 1 to 15 atms.

11. A method according to claim 9, wherein said oxidizing is performed in an oxidizing atmosphere.

12. A method according to claim 9, wherein said oxidizing is performed in an oxidizing atmosphere containing water vapor.

13. A method according to claim 9, wherein said oxidizing the semiconductor film is performed in a temperature of 500 to 650°C.

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14. A method according to claim 9, wherein said semiconductor film has a thickness of 100 to 1,000 Å.

15. A method according to claim 9, wherein at least one region of the semiconductor film is completely oxidized to a bottom surface of the semiconductor film during said oxidizing step.

16. A method according to claim 9, wherein said semiconductor device comprises an active matrix type display device.

17. A method of manufacturing a semiconductor device comprising the steps of:

forming a semiconductor film comprising silicon over an alkali-free glass substrate;

crystallizing said semiconductor film; and

oxidizing the crystallized semiconductor film at a pressure higher than 1 atm.

18. A method according to claim 17, wherein said pressure is in a range of 1 to 15 atms.

19. A method according to claim 17, wherein said oxidizing is performed in an oxidizing atmosphere.

20. A method according to claim 17, wherein said oxidizing is performed in an oxidizing atmosphere containing water vapor.

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21. A method according to claim 17, wherein said oxidizing the semiconductor film is performed in a temperature of 500 to 650°C.

22. A method according to claim 17, wherein said semiconductor film has a thickness of 100 to 1,000 Å.

5 23. A method according to claim 17, wherein at least one region of the semiconductor film is completely oxidized to a bottom surface of the semiconductor film during said oxidizing step.

24. A method according to claim 17, wherein said semiconductor device comprises an active matrix type display device.

10 25. A method of manufacturing a semiconductor device comprising the steps of:

forming a semiconductor film comprising silicon over a glass substrate;

crystallizing said semiconductor film;

forming a gate insulating film adjacent to said crystallized semiconductor film; and

forming a gate electrode adjacent to said gate insulating film, wherein said method further comprises a step of oxidizing the crystallized semiconductor film at a pressure higher than 1 atm.

20 26. A method according to claim 25, wherein said pressure is in a range of 1 to 15 atm.

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27. A method according to claim 25, wherein said semiconductor device comprising at least one top gate type thin film transistor.

28. A method according to claim 25, wherein said oxidizing is performed in an oxidizing atmosphere containing water vapor.

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29. A method according to claim 25, wherein said oxidizing the semiconductor film is performed in a temperature of 500 to 650°C.

30. A method according to claim 25, wherein said semiconductor film has a thickness of 100 to 1,000 Å.

31. A method according to claim 25, wherein at least one region of the semiconductor film is completely oxidized to a bottom surface of the semiconductor film during said oxidizing step.

32. A method according to claim 25, wherein said semiconductor device comprises an active matrix type display device.

33. A method of manufacturing a semiconductor device comprising the steps of:

forming a semiconductor film comprising silicon on an insulating surface;

crystallizing said semiconductor film;

forming a gate insulating film adjacent to said crystallized semiconductor film; and

forming a gate electrode adjacent to said gate insulating film,

wherein said method ~~further~~ comprises a step of oxidizing the crystallized semiconductor film at a pressure higher than 1 atm.

34. A method according to claim 33, wherein said pressure is in a range of 1 to 15 atms.

35. A method according to claim 33, wherein said semiconductor device comprising at least one top gate type thin film transistor.

36. A method according to claim 33, wherein said oxidizing is performed in an oxidizing atmosphere containing water vapor.

37. A method according to claim 33, wherein said oxidizing the semiconductor film is performed in a temperature of 500 to 650°C.

38. A method according to claim 33, wherein said semiconductor film has a thickness of 100 to 1,000 Å.

39. A method according to claim 33, wherein at least one region of the semiconductor film is completely oxidized to a bottom surface of the semiconductor film during said oxidizing step.

40. A method according to claim 33, wherein said semiconductor device comprises an active matrix type display device.

41. A method of manufacturing a semiconductor device comprising the steps of

forming a semiconductor film comprising silicon over an alkali-free glass substrate;

crystallizing said semiconductor film;

5 forming a gate insulating film adjacent to said crystallized semiconductor film; and

forming a gate electrode adjacent to said gate insulating film, wherein said method further comprises a step of oxidizing the crystallized semiconductor film at a pressure higher than 1 atm.

10 42. A method according to claim 41, wherein said pressure is in a range of 1 to 15 atms.

43. A method according to claim 41, wherein said semiconductor device comprising at least one top gate type thin film transistor.

44. A method according to claim 41, wherein said oxidizing is performed in an oxidizing atmosphere containing water vapor.

15 45. A method according to claim 41, wherein said oxidizing the semiconductor film is performed in a temperature of 500 to 650°C.

46. A method according to claim 41, wherein said semiconductor film has a thickness of 100 to 1,000 Å.

20 47. A method according to claim 41, wherein at least one region of the semiconductor film is completely oxidized to a bottom surface of the semiconductor film during said oxidizing step.

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48. A method according to claim 41, wherein said semiconductor device comprises an active matrix type display device.

49. A method of manufacturing a semiconductor device comprising the steps of:

5 forming a semiconductor film comprising silicon over a glass substrate;

crystallizing said semiconductor film; and

heating the crystallized semiconductor film in an oxidizing atmosphere at a pressure higher than 1 atm.

10 50. A method according to claim 49, wherein said pressure is in a range of 1 to 15 atms.

51. A method according to claim 49, wherein said oxidizing atmosphere contains water vapor.

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52. A method according to claim 49, wherein said heating the semiconductor film is performed in a temperature of 500 to 650°C.

53. A method according to claim 49, wherein said semiconductor film has a thickness of 100 to 1,000 Å.

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54. A method according to claim 49, wherein at least one region of the semiconductor film is completely oxidized to a bottom surface of the semiconductor film during said heating step.

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55. A method according to claim 49, wherein said semiconductor device comprises an active matrix type display device.

56. A method of manufacturing a semiconductor device comprising the steps of:

forming a semiconductor film comprising silicon on an insulating surface;

crystallizing said semiconductor film; and

heating the crystallized semiconductor film in an oxidizing atmosphere at a pressure higher than 1 atm.

57. A method according to claim 56, wherein said pressure is in a range of 1 to 15 atms.

58. A method according to claim 56, wherein said oxidizing atmosphere contains water vapor.

59. A method according to claim 56, wherein said heating the semiconductor film is performed in a temperature of 500 to 650°C.

60. A method according to claim 56, wherein said semiconductor film has a thickness of 100 to 1,000 Å.

61. A method according to claim 56, wherein at least one region of the semiconductor film is completely oxidized to a bottom surface of the semiconductor film during said heating step.

62. A method according to claim 56, wherein said semiconductor device comprises an active matrix type display device.

63. A method of manufacturing a semiconductor device comprising the steps of:

5 forming a semiconductor film comprising silicon over an alkali-free glass substrate;

crystallizing said semiconductor film; and

heating the crystallized semiconductor film in an oxidizing atmosphere at a pressure higher than 1 atm.

10 64. A method according to claim 63, wherein said pressure is in a range of 1 to 15 atms.

65. A method according to claim 63, wherein said oxidizing atmosphere contains water vapor.

66. A method according to claim 63, wherein said heating the semiconductor film is performed in a temperature of 500 to 650°C.

67. A method according to claim 63, wherein said semiconductor film has a thickness of 100 to 1,000 Å.

68. A method according to claim 63, wherein at least one region of the semiconductor film is completely oxidized to a bottom surface of the semiconductor film during said heating step.

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69. A method according to claim 63, wherein said semiconductor device comprises an active matrix type display device.

70. A method of manufacturing a semiconductor device comprising the steps of:

5 forming a semiconductor film comprising silicon over a glass substrate;

crystallizing said semiconductor film;

forming a gate insulating film adjacent to said crystallized semiconductor film; and

10 forming a gate electrode adjacent to said gate insulating film, wherein said method further comprises a step of heating the crystallized semiconductor film in an oxidizing atmosphere at a pressure higher than 1 atm.

15 71. A method according to claim 70, wherein said pressure is in a range of 1 to 15 atms.

72. A method according to claim 70, wherein said semiconductor device comprising at least one top gate type thin film transistor.

73. A method according to claim 70, wherein said oxidizing atmosphere contains water vapor.

20 74. A method according to claim 70, wherein said heating the semiconductor film is performed in a temperature of 500 to 650°C.

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75. A method according to claim 70, wherein said semiconductor film has a thickness of 100 to 1,000 Å.

76. A method according to claim 70, wherein at least one region of the semiconductor film is completely oxidized to a bottom surface of the semiconductor film during said oxidizing step.

77. A method according to claim 70, wherein said semiconductor device comprises an active matrix type display device.

78. A method of manufacturing a semiconductor device comprising the steps of:

forming a semiconductor film comprising silicon on an insulating surface;

crystallizing said semiconductor film;

forming a gate insulating film adjacent to said crystallized semiconductor film; and

forming a gate electrode adjacent to said gate insulating film, wherein said method further comprises a step of heating the crystallized semiconductor film in an oxidizing atmosphere at a pressure higher than 1 atm.

79. A method according to claim 78, wherein said pressure is in a range of 1 to 15 atms.

80. A method according to claim 78, wherein said semiconductor device comprising at least one top gate type thin film transistor.

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81. A method according to claim 78, wherein said oxidizing atmosphere contains water vapor.

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82. A method according to claim 78, wherein said heating the semiconductor film is performed in a temperature of 500 to 650°C.

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5 83. A method according to claim 78, wherein said semiconductor film has a thickness of 100 to 1,000 Å.

84. A method according to claim 78, wherein at least one region of the semiconductor film is completely oxidized to a bottom surface of the semiconductor film during said oxidizing step.

10 85. A method according to claim 78, wherein said semiconductor device comprises an active matrix type display device.

86. A method of manufacturing a semiconductor device comprising the steps of:

forming a semiconductor film comprising silicon over an alkali-free glass substrate;

crystallizing said semiconductor film;

forming a gate insulating film adjacent to said crystallized semiconductor film; and

forming a gate electrode adjacent to said gate insulating film, wherein said method further comprises a step of heating the crystallized semiconductor film in an oxidizing atmosphere at a pressure higher than 1 atm.

87. A method according to claim 86, wherein said pressure is in a range of 1 to 15 atms.

88. A method according to claim 86, wherein said semiconductor device comprising at least one top gate type thin film transistor.

89. A method according to claim 86, wherein said oxidizing atmosphere contains water vapor.

90. A method according to claim 86, wherein said heating the semiconductor film is performed in a temperature of 500 to 650°C.

91. A method according to claim 86, wherein said semiconductor film has a thickness of 100 to 1,000 Å.

92. A method according to claim 86, wherein at least one region of the semiconductor film is completely oxidized to a bottom surface of the semiconductor film during said oxidizing step.

93. A method according to claim 86, wherein said semiconductor device comprises an active matrix type display device.